



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

AMENDMENT

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Applicant: Block Docket No.: ROC920000123US1
Serial No.: 09/718,924 Group Art Unit: 2153
Filed: 11/22/00 Examiner: Edelman, Bradley E.

TITLE: APPARATUS AND METHOD FOR COMMUNICATING BETWEEN
COMPUTER SYSTEMS USING A SLIDING SEND WINDOW FOR
ORDERED MESSAGES IN A CLUSTERED COMPUTING
ENVIRONMENT

Mail Stop NON-FEE AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

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Technology Center 2100

Sir:

In response to the office action dated March 1, 2004, please amend the subject patent application as follows.

IN THE SPECIFICATION

Please delete the paragraph from p. 4 line 5 to p. 5 line 14, and substitute therefor the following replacement paragraph:

al
The preferred embodiments of the present invention will hereinafter be described in conjunction with the appended drawings, where like designations denote like elements, and:

FIG. 1 is a block diagram of computer systems that may intercommunicate on a network;

FIG. 2 is a block diagram of programs that run on a prior art node to support multicast communication in a clustered computing environment;

FIG. 3 is a block diagram of the clustered communication mechanism 260 shown in FIG. 2;

FIG. 4 is a block diagram of a clustered communication mechanism in accordance with the preferred embodiments;

FIG. 5 is a diagram showing the concepts behind the sliding send window of the preferred embodiments;

FIG. 6 is a block diagram of a computer system in accordance with the preferred embodiments that serves as a node in a cluster;

FIG. 7 is a block diagram showing three different computer systems that are interconnected via a local area network (LAN) in a cluster;

FIG. 8 is a diagram that shows the prior art interaction between the nodes of FIG. 7;

FIG. 9 is a diagram that shows the interaction between the nodes of FIG. 7 in accordance with the preferred embodiments;

FIG. 10 is a flow diagram of a method for implementing a sliding send window in accordance with the preferred embodiments;

FIG. 11 is a block diagram showing the information contained in a message header in accordance with the preferred embodiments;

FIG. 12 is a block diagram showing that a delayed ACK flag is part of the flags portion 1114 of the header in FIG. [12] 11;

FIG. 13 is a block diagram that shows a sample hybrid network connection between four nodes located on different local area networks (LANs);

FIG. 14 is a block diagram showing features of node A shown in FIGS. 13 and 15; and

FIG. 15 is a diagram that shows the interaction between the nodes of FIG. 13 in accordance with the preferred embodiments.

Please delete the paragraph at p. 16 lines 1-15, and substitute therefor the following replacement paragraph:

AR Referring now to FIG. 10, a method 1010 shows the steps performed in one exemplary method in accordance with the preferred embodiments when a message is in the send queue of a node (step 1020). The message is sent to the specified recipients (step 1030). The message may be a multicast message for all nodes in a group, or may be a point-to-point message that is communicated directly to each recipient node. Note that the recipient node(s) may be different than the nodes in a group, allowing multicast and point-to-point communications to be [intermingles] intermingled while preserving the ordering of messages from a particular source. The specified recipients then process the message (step 1040). If the message specifies an immediate acknowledge (or ACK) (step 1050=YES), the ACK is sent by each recipient as soon as the recipient processes the message (step 1060). However, if the message does not specify an immediate acknowledge (step 1050=NO), the ACK for the message is delayed and grouped with one or more ACKs for subsequent messages (step 1070). In this manner a recipient can group together ACKs into a single ACK that specifies that multiple messages are being acknowledged.